POCKET COMPUTER NEWSLETTER

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SHARP TO INTRODUCE WALLET-SIZE PC TO U.S. MARKET

Sharp Electronics Corporation plans to introduce a new pocket unit dubbed the PC-1250 to the U.S. market in late January/early February. The small 5-5/16 by 2-3/4 by 3/8 inch computer is slated to retail at $109.95. It is reported to contain approximately 2K of RAM memory, including 1438 bytes of user program memory and 48 bytes of reserve user memory. In some respects an apparent upgrade of its earlier model PC-1211, the new unit has an enhanced BASIC. While claiming to be "upwards compatible" with the PC-1211, the BASIC will be capable of handling two-dimensional arrays and dealing effectively with strings.

Other enhancements over the PC-1211 include the BASIC statements DATA, READ and RESTORE, plus RANDOM and several commands for use with an optional cassette/printer interface.

The unit retains the excellent program editing features of its predecessor, such as cursor shifting, character insertion and deletion and line scrolling forwards or backwards. The display is a 24-digit dot matrix liquid-crystal display without "graphics" capability.

The new PC is reported to operate for about 300 hours of "display on" time when powered by a pair of lithium cells. Of course, memory is retained when the unit is in the powered-down non-display mode.

An optional printer/cassette unit, designated the CE-125 will also be made available for the new pocket computer. It will combine a 24-character thermal printer and a complete microcassette storage system. Note that the thermal printer width matches the width of the 24-character LCD of the PC-1250. The thermal printer will also be much quieter than Sharp's earlier ink printer for the PC-1211. The CE-125 measures 8-1/16 by 5-7/8 by about 1 inch. With the new PC mounted on it, Sharp reports it is about the size of an average hardcover book. The unit includes a complete microcassette recorder with which data and programs may be saved and restored to the PC. The tape unit is equipped with a tape counter to facilitate locating information rapidly. The optional CE-125 peripheral is reported to have a U.S. retail price of $169.95.

For more information, contact: *Sharp Electronics Corporation, 10 Sharp Plaza, Paramus, NJ 07652.*

A FIRST LOOK AT THE EPSON HX-20

David G. Motto, 3639 Roosevelt Circle, Jackson, MI 49203, passes along these first-hand comments about his experiences with the new Epson HX-20 portable computer:

Never buy the first one of anything. I always say that, but then I do it anyway. I recently ordered an Epson HX-20 from **Elek-Tek** in Chicago. It took about a week to arrive from the time they said they would ship it.

The unit is not much bigger than an HP-75C. *[Sorry, Dave, but I think that 8-1/2 by 11-3/8 by 1-3/4 is substantially larger than 5 by 10 by 1-1/4 — N.W.]* It contains a noisy dot-matrix printer, a 20 by 4 (characters) liquid-crystal display screen, a full-size keyboard, a couple of weird-looking plugs for RS-232C and serial interfaces, and other assorted goodies.

Alas, when I opened the package, I noted that something was missing. The computer was shipped without any BASIC manuals. It did come with a nice owner's manual that tells how to charge the battery, install the paper and ribbon, move the cursor around the screen, and so forth. But, only one BASIC command is mentioned in that book. It would be rather difficult to write a program using just one command!

A notice on the shipping invoice said that the manuals would be shipped soon. But, waiting wouldn't be any fun. I decided to dive in on my own. I charged up the batteries, then turned the machine on. (The on/off switch is a recessed lever on the right side of the unit.) Then, I selected "2" from the menu on the LCD and the display responded with:

```
EPSON BASIC V-1.0
Copyright 1982 by
Microsoft & EPSON
P1:          0 Bytes
```

Then I started trying things. PRINT "DAVE" worked. I started making a list of directives that worked: MID$, LEFT$, RIGHT$, SOUND 5,1 (made a beep!). I tried the five keys labeled PF1 through PF5 that are right underneath the display screen. Each one caused a keyword to be printed: AUTO, LIST, LLIST, STAT, and RUN. All except AUTO and STAT execute immediately. However, if the printer is off, then LLIST won't cause any activity.

After spending several days experimenting, I found over 150 BASIC commands and functions. PEEK helped me to write a program that found itself in memory, but POKE would not allow my program to modify itself. I had to turn to the built-in Monitor program to help me on that project.

You can get back to the main menu just by pressing the Menu key. I would rather they make it a little harder, because it will interrupt whatever is going on.

The main menu consists of three choices: CTRL/@ Initialize. If you press the @ key while holding the control key, you can reset memory and the real-time clock. Another option puts you in the Monitor mode. The third is BASIC.

Ever try to operate a monitor program when you do not know the instructions? It is fun, but *dangerous!*

I went into the monitor mode and started trying letters of the alphabet. The letter "A" resulted in the contents of four items named T, L, O and E being displayed. Guess I will have to wait for the manuals for an explanation of those. The letter "D" followed by an address resulted in the display of 15 bytes of memory, but the cursor could not be moved to type over them (as can be done, on say, a Commodore PET). The letter "X" displayed the registers A, B, C, P, S and X. These are the accumulator, two single-byte registers (with C being, I think, the flag register), and 3 two-byte registers (possibly the program counter, stack pointer and index registers?). The letter "B" returned control to the main menu or back to BASIC if the MON directive had been used to get into the Monitor mode. The operation I was really looking for is invoked by the letter "S". It displays data and lets me change it!

I then located my program in memory and started trying to enter numbers larger than 127 on the first line of it. Complications arose. The keywords are stored as single-byte or two-byte codes. It appears that if they are double-byte, the first part is always 255. I think I have found most of the keyword codes.

Many of the built-in commands are used to access the not-built-in microcassette recorder. Did I mention that you can record programs on a regular cassette with the built-in interface?

Armed with my self-made list of BASIC instructions and some knowledge of Microsoft BASIC for CP/M computers, I worked on a few tiny programs. There are 12,891 bytes available to the user in the basic non-expanded system. I consider the BASIC to be very good — better than Sharp's — with more commands, double precision (16 digits) arithmetic, some other capabilities. The number range, however, is only 10 to the 39th power, but how often do you deal with numbers greater than that?

The screen contents can be copied to the printer either with a couple of keystrokes or under program control. Pictures are possible as any dot on the 120 by 32 matrix can be turned on, off or tested for status. You can have five separate programs in memory at one time, with the same line numbers. You can run them from the main menu at the press of a button.

Disaster, however, struck my unit a few days after I received it! The first, second, seventeenth and eighteenth lines on my dot-matrix display stopped working. I had to package the unit up and send it back for repairs or replacement. Despite this early failure, however, I still like it!

Some other noteworthy observations: None of the promised accessories, such as the microcassette player, cables for RS-232C and serial interfaces, extra ribbons, paper, the CX-20 communications adaptor, modules, memory expansion or carrying case are available yet. The display has a control on it (similar to the Casio FX-702P contrast adjuster) that allows the display to be effectively "tilted." Sound volume is not adjustable. The computer beeps twice when power is first applied. Of course, memory contents are preserved when the unit is turned off. The HX-20 will run BASIC programs for about 50 hours (continuously) between an 8-hour recharge of its batteries. The keyboard is springy and feels good. There is a hidden numberic keypad for performing arithmetic calculations when in the BASIC direct execute mode. Error codes consist of two letters, as in the Panasonic HHC.

Even though you cannot fit an Epson in your pocket, I recommend *PCN* readers take a look at it.

SOME DETAILS ON EPSON'S BASIC

The Epson HX-20 has a lot of BASIC commands and statements that will be familiar to Sharp PC-1500 users, such as: END, FOR, NEXT, DATA, DIM, READ, LET, GOTO, GOSUB, RUN, IF, RESTORE, RETURN, REM, STOP, TRON, TROFF, ON, LPRINT, LLIST, PRINT, CONT, LIST, CLEAR, NEW, LOAD, SAVE, MERGE, PUT, GET, TAB, TO, SPC, USING, OFF, THEN, NOT, STEP, AND, OR, SGN, INT, ABS, SQR, LOG, EXP, COS, SIN, ATN, PEEK, LEN, STR$, VAL, ASC, CHR$, LEFT$, RIGHT$, RND, and the usual mathematical operators. These commands and statements (except for RND, which gives a random number in the range 0 to 1) are similar to those on the Sharp PC.

But, there are a host of BASIC statements, functions and commands on the HX-20 that give greatly enhanced capabilities to this portable unit. Here is a list of some of these new instructions with a brief explanation of their powers:

SWAP x,y	Exchanges the values in the variables x and y. Great in sorting situations.
DEFSTR, DEFINT, DEFSNG, DEFDBL	Used to define variables to be STRing, INTeger, SiNGle precision or DouBLe precision. Variables may be over 11 characters long and may contain embedded keywords.
RENUM m,n	Renumbers the program segment beginning with line m using an increment of n line numbers.

(continued on next page)

EPSON'S BASIC
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ERROR n	Forces the error number n to occur, used for debugging or other purposes.
RESUME 0	Resumes program execution after an ON ERROR GOTO error trap. Can specify resumption with the same line, the next line or any specified line.
AUTO m,n	Begins automatic line numbering at line m with an increment of n.
DELETE m–n	Delete program lines m through n.
DEF FN x(y,z)	Define a function (similar to a one-line subroutine) named x with parameters y and z or more, if desired.
CLEAR n	Reserve n memory locations for string space. Default is 200 bytes.
OPTION BASE n	Set the first array element to be at 0 or 1.
RANDOMIZE n	Provide a seed to the random number generator.
ERASE x	Erases the array x to open up memory space.
LINE INPUT x	Accepts a line of input, but will not stop execution if only the RETURN key is used.
SCROLL n	Sets up the number of lines that the display will roll in either direction when display control keys are pressed.
SOUND x,y	Plays sound tone n (1 –56) for duration y.
MON	Passes control to the machine language monitor.
CLS	Clears the screen.
WIDTH x,y	Sets up the number of columns (x) and rows (y) which may be used by the virtual screen. Only 20 by 4 lines may be viewed at one time. Default value is 40 by 8.
COLOR n	Selects color from 0 to 7. (Plotter, TV?)
LOGIN x	Places you into workspace number 1 through 5. Each program workspace is separate, with its own line numbers. Like Casio's P0 through P9.
TITLE x	Gives the current workspace a title, Prevents the space from being accidently erased. Title appears on the main menu.
FRE(x)	Gives the number of bytes remaining in memory.
POS(x)	Yields the current column position.
EOF(x)	Provides the end-of-file status for file x.
CINT	Convert numbers from other forms to INTeger,
CSNG	SiNGle-precision or
CDBL	DouBLe-precision format.
FIX(x)	Returns the fixed-point portion of the number x. Is not the same as INT(x) when dealing with negative numbers.
SPACE$(n)	Provides n spaces.
HEX$	Converts numbers to hexadecimal notation.
OCT$	Converts numbers to octal notation.
MID$	Can be used on the left side of an equation to change the characters in a string at specified locations.
INSTR(x,y)	Locates where substring y begins in string x.
VARPTR x	Shows where the variable x is located in memory.
TIME$	Gives the time as hh:mm:ss
DATE$	Gives the date as mm/dd/yy
DAY	Gives the day of the week, Sunday = 0 through Saturday = 6.
INPUT$(x)	Waits for the receipt of x characters. Does not need RETURN.
POINT(x,y)	Give the status of the dot at position x,y.
PSET(x,y)	Turn on the dot at position x,y.
PRESET(x,y)	Turn off the dot at position x,y.
SCREEN n	Select screen 0 or 1.
COPY	Puts a copy of the screen on the printer.
TAPCNT	Displays the microcassette tape counter value.

UNDERSTANDING THE PC-1500

This is the fourth article in a series being presented by *Norlin Rober, 407 North 1st Avenue, Marshalltown, IA 50158.* Unless otherwise noted, the information presented by Norlin in this series also applies to the Radio Shack PC-2 unit.

Since it was first introduced, the Sharp PC-1500 has undergone a number of changes. Most of these are nearly unnoticeable to the average user. Many of these changes have been to correct minor errors. A few of the improvements, however, are rather significant.

The integrated circuit containing the ROM chip is stamped with one of the following identifying numbers:

A01 Original version.
A03 First revision. Also used in Radio Shack's PC-2.
A04 Latest version.

Apparently, there is no version A02 in widespread use.

You can readily identify the version in your machine (without physically opening your unit) by peeking at a few locations and using the following information:

Version	PEEK &C443	PEEK &C5BD
A01	56	129
A03	59	129
A04	59	74

I have identified many of the effects (but not all) of the modifications that have been made by various revisions to the ROM. Here are comments regarding these alterations.

Minor Improvements

1.) In version A01, when program execution is begun automatically using an ARUN statement, the BUSY signal in the display fails to turn on. This was corrected in version A03.

2.) In the original version, a program line may not consist of only a label. If you attempt to use such a line, ERROR 21 will result whenever the line is reached during program execution. A label alone may be used as a program line when ROM versions A03 and A04 are installed.

3.) In version A01, a statement containing USING, followed by the name of a numeric variable, will produce either a fatal crash or an execution of the power-up routine (with NEW0? :CHECK displayed). One may demonstrate this phenomena by typing USING A, followed by ENTER. This defect was corrected in version A04.

4.) In the REServe mode, a "template" of exactly 26 characters will place a zero byte in the location immediately following the template. This cancels a previously defined REServe key or template. (This only applies to the A01 ROM version). To illustrate, do the following:

A. Set the REServe mode, clear REServe memory with NEW.
B. Set to Group III. Assign something to one of the REServe keys.
C. Enter a template containing exactly 26 characters. (Note that now the assignment made to the REServe key has been lost.)
D. Set to Group II. Enter a template of exactly 26 characters. Now the template previously set for Group III has disappeared!

This defect was corrected in version A03.

5.) In REServe mode, with a version A01 ROM, it is not possible to clear the phrase assigned to a REServe key by overwriting with spaces.

6.) Under certain circumstances, when the input buffer is filled, the display continues on to include the contents of &7800 and beyond. This particular quirk exists in version A01 and in at least some PCs with version A03. In at least some cases, it does not occur with version A04. To demonstrate the problem, clear the display, then fill it with the token for RETURNs by repeatedly keying in DEF Y. When the end of the input buffer has been reached, there will probably be something unexpected appearing at the right end of the display. (If nothing happens, try POKE &7800, 87, 72, 65, 84, 63 and then repeat the above.)

7.) Another oddity, occurring only in version A01, can be observed by doing the following:

A. Enter the program line: 10 PRINT "ANYTHING"
B. In the RUN mode, key the following:
RUN
ENTER
1

ENTER
Up arrow
Cursor left

Note that the program line has been placed into the display, without the usual colon following the line number.

8.) Here is another quirk involving the display that appears in version A01 only. Enter the program line:

10 INPUT "A";A

Now RUN the program. In response to the prompt, enter just a plus sign (rather than a legal input). The display will show: ERROR 1. Note that using the CL key will not completely remove the error message.

9.) Enter the program line:

10 GCURSOR 152:INPUT A

When the program is executed, the display will show ERROR 32 IN 10, as expected. However, in version A01, the use of CL or Up arrow will not clear the error message. In version A03, the error message is cleared, but the computer continues to wait for input, with a partial question mark displayed at the right end of the LCD. (Version A04 works fine.)

Major Improvements

1.) In version A01 only, it is possible to completely mess up a program when variable storage in main memory occupies exactly one more byte than for which there is room. (Thanks to *Stan Kameny* for noting this problem.) What happens is that the "stop byte" following the last program line is overwritten by the variable. To illustrate the defect:

A. Clear using NEW0 and enter the program line:
   10 ABCDEFGH
B. In RUN mode, execute one of the following, depending on how much RAM expansion you have installed in your PC:
   No expansion: DIM A(228)
   4K expansion: DIM A(2, 246)
   8K expansion: DIM A(6, 178)
C. Now set PRO mode and LIST the program. Use the Down arrow to observe that the stop byte has been lost. Entering more program lines now will cause additional confusion, extending to the contents of REServe memory. Enter the program line:
   60000 ABCDEFGH
D. Note the effect on REServe memory.

2.) In versions A01 and A03, the use of Boolean operators will produce incorrect results when inputs are negative numbers that are represented internally in binary form. Since ordinarily these Boolean operators are used with positive inputs only, the errors are of less consequence than it might seem at first. To illustrate:

A. NOT NOT 1 returns -31233. The correct result is 1.
B. 1 OR (-1 OR 1) returns 31233. The correct result is -1.
C. 1 AND (-1 OR 1) returns 0. The correct result is 1.

In version A04, none of these errors occur.

3.) In the RADIAN and GRAD modes (only), certain input arguments used with trigonometric functions produce incorrect results. This bug was corrected in version A04. In RADIAN mode, any input whose mantissa digits are 174532925199 will be treated as zero. In GRAD mode the same applies to mantissas having digits: 111111111111. To illustrate:

A. In RADIAN mode, SIN(π/18) returns 0. The correct result is .1736481777.
B. In GRAD mode, TAN(100/9) returns 0. The correct result is .1763269807.

Some Changes in the Operation of BASIC

In version A04 of the ROM, two changes were made to make Sharp BASIC more compatible with other BASICs. These changes must be taken into account if a program is to operate correctly amongst all PC-1500 and PC-2 computers.

1.) A change was made in the interpretation of a statement beginning with an IF expression. (Example: IF A THEN 50.) In versions A01 and A03, such a statement was regarded by the PC as true if the value of the expression was positive and false if zero or negative. In A04 it is considered as true if non-zero, false if zero.

2.) A change in the interpretation of FOR/NEXT loops affects the number of passes made through the loop for cases in which the final value of the index variable does not exactly equal the test value. In versions A01 and A03, when NEXT is executed the index variable is first compared with the test value. If it is less than the test value, it is incremented by the step size and the loop is repeated. In version A04, NEXT always increments the index variable and then compares the incremented result to the test value. The loop is repeated unless the new (incremented) index variable exceeds the test value. (Of course, if a negative number is being used as a step value, then this description must be modified.) The following summary should clarify the differences:

	A01, A03	A04
A. Loop: FOR X=0 TO 3		
Values of X used in loop:	0, 1, 2, 3	0, 1, 2, 3
Value of X after loop finished:	3	4
B. Loop: FOR X=0 TO 5 STEP 2		
Values of X used in loop:	0, 2, 4, 6	0, 2, 4
Value of X after loop finished:	6	6

A Warning!

Do not use the Boolean NOT operator in an IF statement. The use of NOT in a conditional test is not interpreted by the PC-1500 as meaning the negation of a logical statement. When Sharp chose to make the logical value of a true statement 1 and a false statement 0, they automatically ruled out the possibility of allowing NOT to mean negation. (Note that in Sharp's system, 0 and 1 may not have the same truth value. But, NOT 0 and NOT 1 are both calculated as negative numbers, thereby making NOT 0 and NOT 1 identical in truth value!) Perhaps this should be treated as a choice made by the designers, rather than as an error?

Here are a few examples you may use to convince yourself that NOT doesn't belong in an IF statement.

A. With ROM versions A01 or A03, enter the program line:
   10 IF NOT (1=2) BEEP 1
   Since it is not the case that 1=2, one would expect to hear a beep. There won't be one if you have ROM A01 or A03. However, the corrections made in A04 (regarding Boolean operators) affect the the use of NOT in IF statements. Thus, this example when run on a PC having ROM version A04, does produce a beep. However, the program line:
   10 IF NOT (1=1) BEEP 1
   does yield a beep with an A04 ROM, contrary to expectations. (There is no beep in the earlier ROMs with this statement.)

In Conclusion

It is to Sharp's credit that they are making efforts to constantly upgrade the PC-1500. However, anyone considering purchasing a new unit might first wish to make certain that they are getting the latest version of the PC. Users of earlier units may take care when programming to avoid the pitfalls discussed in this article.

HISTOGRAM PROGRAM

Russel Doughty, 3604 Northwick Place, Bowie, MD 20716, developed the program shown in the accompanying listing. He also provided the following comments regarding its use and application.

If you have ever used statistics, you know that they can often be misleading. Suppose you have a group of one hundred people with an average income of $20,000 ($20K). This could mean that they all make $20K or that fifty make $30K and fifty make $10K or that ten make $200K and the rest are unemployed!

In short, that single "average" number does not tell you much about the true distribution of incomes. It takes a look at the standard deviation, variance, minimum and maximum values to begin to get a true picture. Even then it can take a fair amount of interpretation to sort things out. But, your trusty Radio Shack PC-2 or Sharp PC-1500 and the plotting capabilities of its printer/cassette interface are a natural for creating "histograms." This is a statistical method that literally draws a picture of the data distribution.

You create a histogram by sorting your data into equally spaced "cells." Then you count the number of data points in each cell. For

the income example just mentioned, you might find (using your PC to analyze the data, of course!) that the minimum and maximum incomes were $10K and $100K respectively. You might choose the width of cells, then, to be $10K. You would then sort the data into nine cells: $10–20K, $20–30k, . . . $80–90K and $90–100K. You would then count the number of data points falling within each cell and plot the results. You end up with a visual representation of the data distribution. Interpretation becomes easy.

That is essentially what the accompanying program does. You will need a memory expansion module to use the program. It is written to utilize an 8K module. I believe the program will work satisfactorily in a system having only a 4K module, provided that you reduce the array named X that is DIMensioned in line 100.

Start the program using a RUN directive. The program will ask if you need instructions. Responding "Y" for yes results in the printout of a summary of the DEFined keys that have been established to facilitate selecting various program operations.

Initially, the program prompts for data inputs. When you have

Program *Histogram*

```
100:CLEAR :H=1:DIM
    X(255):DIM F(5
    1)
108:WAIT 100:PRINT
    "          HIST
    OGRAM"
112:INPUT "NEED IN
    STRUCTIONS(Y/N
    )? ";Z$:IF Z$=
    "Y"GOSUB 2000
114:PRINT "ENTER D
    ATA"
200:"A"WAIT 5
210:PRINT "X(";H;"
    )";CURSOR 8:
    INPUT X(H):CLS
220:H=H+1:GOTO 210
500:"S"TEXT :
    LPRINT :COLOR
    0:LPRINT "STAT
    ISTICS":LPRINT
510:FOR J=1TO H:
    FOR Q=1TO H-J
530:A=X(Q):C=X(Q+1
    )
550:IF A<CTHEN 580
560:X(Q)=C:X(Q+1)=
    A
580:NEXT Q
590:NEXT J
600:Z=0:S=0:FOR I=
    2TO J:S=S+X(I)
    :NEXT I:M=S/(J
    -1)
605:FOR I=2TO J:Z=
    Z+X(I)*X(I):
    NEXT I
607:V=(Z-(J-1)*M*M
    )/(J-2):CSIZE
    1
610:LPRINT USING "
    ######.##";"DA
    TA MIN = ";X(2
    )
620:LPRINT "DATA M
    AX = ";X(J)
630:LPRINT "MEAN
       = ";M:
    LPRINT "STD DE
    V  = ";SV
640:LPRINT "VARIAN
    CE = ";V
645:LPRINT "ENTRIE
    S  = ";H-1
650:WAIT :PRINT
805:"H"INPUT "CELL
     WIDTH ";W
810:Y=INT ((X(J)-X
    (2))/W)+1
815:FOR I=0TO Y:F(
    I)=0:NEXT I
820:FOR I=0TO Y
830:FOR Q=2TO J
835:R=INT (X(2))
840:IF X(Q)>=(R+(I
    *W))AND X(Q)<(
    R+((I+1)*W))
    THEN 848
844:GOTO 850
848:F(I)=F(I)+1
850:NEXT Q:NEXT I
905:"G"TEXT :LF 2:
    GRAPH :
    GLCURSOR (30,-
    150)
910:SORGN :LINE -(
    180,170),0,1,B
920:A=0:M=0
930:FOR I=0TO Y
940:IF A<F(I)THEN
    LET A=F(I)
945:M=M+F(I)
950:NEXT I
960:D=A
970:M=INT (D/M*100
    )
 1000:A=150/D:E=14
      0/(Y+1)
 1010:GLCURSOR (6,
      0):SORGN
 1020:FOR I=0TO Y
 1030:LINE ((I*E),
      0)-(((I+1)*E
      ),(F(I)*A)),
      0,3,B
 1040:NEXT I
 1043:GLCURSOR (-6
      ,0):SORGN
 1044:FOR I=0TO 7
      STEP 2
1045:LINE (0,(10*
     D*A-I*D*A)/1
     0)-(180,(10*
     D*A-I*D*A)/1
     0),2,1:NEXT
     I
1050:TEXT :CSIZE
     1:COLOR 0:LF
     4:LPRINT
     USING "#####
     .##";INT (X(
     2));TAB 26;
     INT (X(2))+W
     *(Y+1)
1055:LF -18:
     LPRINT TAB (
     15);"HISTOGR
     AM":LF -2
1056:LPRINT "%":
     LPRINT "TOT"
     :USING "###"
     :LPRINT TAB
     (1);M
1058:FOR I=2TO 7
     STEP 2:LF 2:
     LPRINT TAB (
     1);INT ((10*
     M-I*M)/10):
     NEXT I
1060:USING "#####
     .##";LF 5:
     LPRINT TAB (
     6);"MAX FREQ
     . = ";D:
     LPRINT TAB (
     6);"CELL WID
     TH= ";W
1065:WAIT :PRINT
1070:"C"LPRINT :
     LPRINT :
     LPRINT TAB 1
     5;"CELL DATA
     "
1080:LPRINT :FOR
     I=0TO Y:
     USING "#####"
     :LPRINT TAB
     (5);"CELL ";
     I+1;" = ";:
     USING "####.
     ##";LPRINT F
     (I);
1081:LPRINT INT (
     X(2)+I*W):
     NEXT I
1082:WAIT :PRINT
1085:"L"LPRINT :
     LPRINT :
     LPRINT TAB (
     12);"RAW DAT
     A LISTING":
     LPRINT
1090:FOR I=2TO H:
     USING "####"
     :LPRINT TAB
     (9);"DATA PT
     .";I-1;" = "
     ;:USING "###
     .##":LPRINT
     X(I)
1091:NEXT I
1092:WAIT :PRINT
     :GOTO 100
2000:CSIZE 1:
     LPRINT "DEF/
     S = STATISTI
     CS":LPRINT "
     DEF/H = HIST
     OGRAM"
2010:LPRINT "DEF/
     C = HISTOGRA
     M CELL DATA"
     :LPRINT "DEF
     /L = RAW DAT
     A LISTING"
2015:LPRINT "DEF/
     A = ADD MORE
      DATA"
2020:LPRINT "YOU
     CAN ENTER UP
      TO 255 DATA
      POINTS"
2030:LPRINT "YOU
     MUST USE DEF
     /S & H BEFOR
     E C OR L"
2040:LF 7:RETURN
STATUS 1       1853
```

entered a sufficient number of points, select the following options using DEFined keys:

DEF/S: Performs statistical analysis on the data and prints minimum, maximum, standard deviation and variance figures.

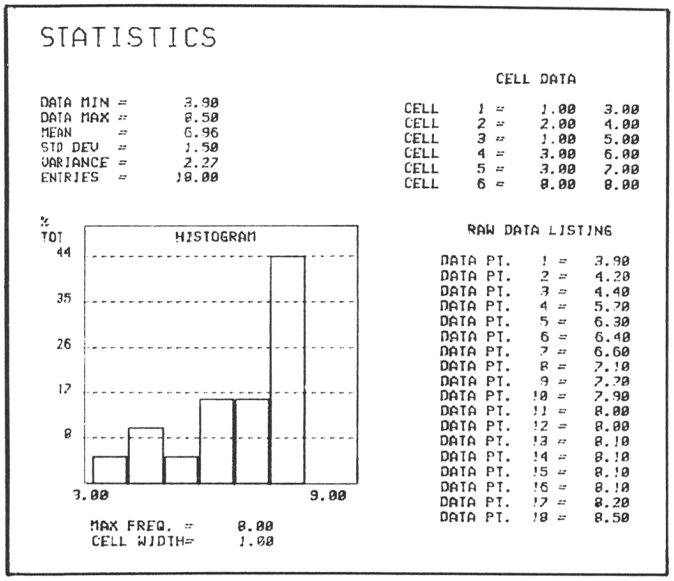
DEF/H: Draws a histogram of the data using the data previously entered and your response to the prompt for the cell width to use. The drawing is done using three pen colors. The vertical axis presents the number of data points in each cell expressed as a percentage of the total number of data points in all cells.

DEF/C: Gives a listing of the counts by cell.

DEF/L: Provides a listing of the data sorted in ascending order.

Have a little patience when working with a lot of data points. Your PC is pretty fast, but it cannot match an IBM 370. Oh yes, the program is designed to accept data having up to two signficant digits on either side of the decimal point. You may change this by altering the USING statements in the program.

Example *Operation of Histogram Program*



THREE-DIMENSIONAL PLOTS

Here is a program that makes it possible to represent three-dimensional surfaces. Curves consisting of the interesection of the surface with a number of equally-spaced "cutting planes" are drawn by the plotter.

To use the program with your PC-2/PC-1500 and plotter unit, line 100 must contain the formula for computing Z as a function of X and Y. A second function beginning at line 200 may be added, if desired.

Once the program has been started, prompts are given for the minimum and maximum values of X, Y and Z. You must also indicate the number of sections (cutting planes) to be drawn and the "increment size" (distance between the cutting planes).

It can take a number of minutes to produce one drawing since the number of points to be plotted can be quite large. Using relatively large increment sizes and reducing the number of cutting planes can speed up the process. However, this results in less detail being shown. Suitable compromise values for the number of sections seems to be in the range of 7 to 11 planes.

The X, Y and Z axes are not drawn by this program in order to avoid unnecessary clutter.

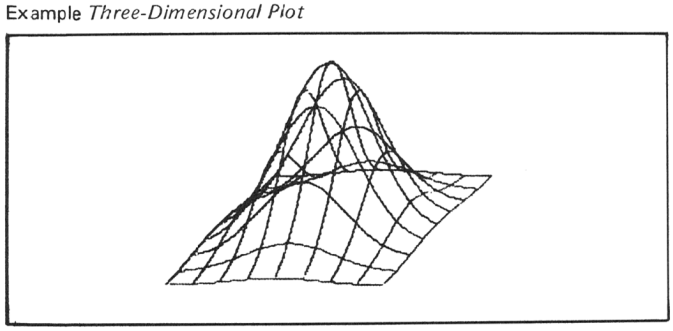
Here are the values used to draw the accompanying sample (for the function included at line 100 in the program listing):

MIN X? -2.5
MAX X? 2.5
MIN Y? -2.5
MAX Y? 2.5
MIN Z? 0
MAX Z? 1.3
NUMBER OF SECTIONS? 9
INCREMENT SIZE? 2

For variety, you might want to experiment with using different colors to draw the cutting planes. The effects could be interesting.

This program submitted by: *Norlin Rober, 407 North 1st Avenue, Marshalltown, IA 50158.*

Example *Three-Dimensional Plot*



Program *Three-Dimensional Plotting*

```
10:INPUT "MIN X?
   ";A
11:INPUT "MAX X?
   ";B
12:INPUT "MIN Y?
   ";C
13:INPUT "MAX Y?
   ";D
14:INPUT "MIN Z?
   ";E
15:INPUT "MAX Z?
   ";F
16:INPUT "NUMBER
   OF SECTIONS? "
   ;G:G=G-1
17:H=1:INPUT "INC
   REMENT SIZE? "
   ;H
18:N=1:INPUT "NUM
   BER OF FUNCTIO
   NS? ";N
20:CLS :TEXT :
   CSIZE 2
21:LPRINT "GRAPHE
   D:":FOR I=1TO
   N:LLIST 100*I,
   100*I+99:LF -3
   :NEXT I:LF 1
22:LPRINT "MIN X=
   ";A:LPRINT "MA
   X X=";B:LPRINT
   "MIN Y=";C:
   LPRINT "MAX Y=
   ";D:LPRINT "MI
   N Z=";E:LPRINT
   "MAX Z=";F
30:XS=(B-A)/144,Y
   S=(D-C)/144,ZS
   =144/(F-E),GS=
   144/G
40:GRAPH :
   GLCURSOR (0,-2
   20):SORGN
50:FOR I=1TO N
51:FOR J=0TO G:K=
   1:XC=J*GS:FOR
   YC=0TO 144STEP
   H:GOSUB 60:
   NEXT YC:NEXT J
52:FOR J=0TO G:K=
   1:YC=J*GS:FOR
   XC=0TO 144STEP
   H:GOSUB 60:
   NEXT XC:NEXT J
53:NEXT I
54:GLCURSOR (0,-7
   0):END
60:X=B-XS*XC:Y=C+
   YS*YC:GOSUB 10
   0*I:L=.5*XC+YC
   :M=.5*XC+ZS*(Z
   -E)
61:IF Z<EOR Z>F
   LET K=1:RETURN
62:IF KGLCURSOR (
   L,M):K=0:
   RETURN
63:LINE -(L,M):
   RETURN
100:Z=EXP (-(X*X+Y
   *Y)/2)
199:RETURN
200:REM  2ND FUNCT
   ION
299:RETURN
STATUS 1          735
```

Program *HP-75C Weather Forecaster*

```
10 DELAY 1 @ DISP "WEATH
ER FORECASTER"
20 A$="S. SW W. NW N. NE
 E. SE "
30 INPUT "BAROMETER (IN)
:"; P @ IF P)=30.2 THEN
S=0
40 IF P(30.2 THEN S=1
50 IF P(30.1 THEN S=2
60 IF P(30 THEN S=3
70 IF P(=29.8 THEN S=4
80 INPUT "(R)ISE, (F)ALL
, (S)TEADY?"; T$ @ X=0
90 IF UPRC$(T$[1,1])#"R"
 THEN 130
100 INPUT "RISING (F)AST
, (S)LOW?"; R$ @ IF UPRC
$(R$[1,1])="F" THEN X=1
@ GOTO 190
110 IF UPRC$(R$[1,1])#"S
" THEN BEEP @ GOTO 100
120 X=2 @ GOTO 190
130 IF UPRC$(T$[1,1])="S
" THEN 190
140 IF UPRC$(T$[1,1])#"F
" THEN BEEP @ GOTO 80
150 INPUT "FALLING (F)AS
T, (S)LOW?";R$
160 IF UPRC$(R$[1,1])="F
" THEN X=3 @ GOTO 190
170 IF UPRC$(R$[1,1])#"S
" THEN BEEP @ GOTO 140
180 X=4
190 INPUT "WIND FROM THE
:"; W$ @ IF LEN(W$)#2 TH
EN BEEP @ GOTO 190
200 W=POS(A$,UPRC$(W$))
@ IF W=0 THEN BEEP @ GOT
O 190
210 W=INT(W/3)+1
300 Y=ABS(W-3)(2
310 IF Y*(S(3) AND X=0 T
HEN Z=1 @ GOTO 600
320 IF Y*(S=1) AND X=1 T
HEN Z=6 @ GOTO 600
330 IF Y*(S=0) AND X=4 T
HEN Z=3 @ GOTO 600
340 Y=W=1 OR W=8
350 IF Y*(S=1) AND X=4 T
HEN Z=4 @ GOTO 600
360 IF Y*(S=1) AND X=3 T
HEN Z=5 @ GOTO 600
370 Y=ABS(W-7)(2
380 IF Y*(S=1) AND X=4 T
HEN Z=4 @ GOTO 600
390 IF Y*(S=1) AND X=3 T
HEN Z=5 @ GOTO 600
400 IF Y*(S)2) AND X=4 T
HEN Z=6 @ GOTO 600
410 IF Y*(S)2) AND X=3 T
HEN Z=7 @ GOTO 600
420 Y=W=6 OR W=7
430 IF Y*(S(2) AND X=4 T
HEN Z=8 @ GOTO 600
440 IF Y*(S(2) AND X=3 T
HEN Z=9 @ GOTO 600
450 IF (W=1 OR W=2) AND
S)2 AND X=2 THEN Z=10 @
GOTO 600
460 IF (W(2 OR W)6) AND
S=4 AND X=3 THEN Z=11 @
GOTO 600
470 IF ABS(W-6)(2 AND S=
4 AND X=3 THEN Z=12 @ GO
TO 600
480 IF ABS(W-3)(2 AND S=
4 AND X=1 THEN Z=13 @ GO
TO 600
490 IF X(3 AND ABS(W-5)(
3 THEN Z=2 @ GOTO 600
500 Z=1 @ IF X=3 THEN Z=
8
600 DISP "FORECAST -->"
@ K$=""
610 ON Z GOSUB 710,720,7
30,740,750,760,770,780,7
90,800,810,820,830
620 K$=KEY$ @ IF K$="" T
HEN 610 ELSE 30
710 DISP "FAIR, LITTLE C
HANGE."; @ RETURN
720 DISP "FAIR, A LITTLE
 COOLER." @ RETURN
730 DISP "FAIR, A LITTLE
 WARMER." @ RETURN
740 DISP "RAIN WITHIN 24
 HRS." @ RETURN
750 DISP "WINDY, RAIN BY
 12 HRS." @ RETURN
760 DISP "INCREASING CLO
UDS, RAIN." @ RETURN
770 DISP "RAIN AND HIGH
WINDS." @ RETURN
780 DISP "UNSETTLED, CHA
NCE RAIN." @ RETURN
790 DISP "RAIN/SNOW, WIN
DY." @ RETURN
800 DISP "CLEARING, BECO
MING FAIR." @ RETURN
810 DISP "SEVERE STORM I
MMINENT." @ RETURN
820 DISP "HEAVY RAIN/SNO
W, WINDS." @ RETURN
830 DISP "CLEARING AND C
OOLER." @ RETURN
```

A FEW MORE WORDS ON THE HP-75C

A number of readers have expressed an interest in the HP-75C since its announcement and subsequent review in *PCN*. (See Issues 17 & 18.) Indeed, a few readers have advised us they have purchased the top-rated machine. To date *PCN* has not received any complaints as to its performance or perceived value. Several major magazines, including McGraw-Hill's *Popular Computing* have recently reviewed and warmly praised the unit. It is high priced, but many professionals appear to be quite enamored by the machine.

We are including a re-write of the Weather Forecasting program developed by *Emerich Auersbacher* that was originally published in Issue 20 of *PCN* for Sharp and Radio Shack PCs. This will give new owners of the HP-75C something to load and use right away. Those of you who might be contemplating the purchase of the HP-75C might want to peruse the program and compare it with the earlier version. There are some substantial differences between this HP version and the original Sharp/Radio Shack version. Remember, HP uses its own proprietary implementation of BASIC. It is quite different in some respects, especially as regards the handling of character strings.

The program uses 2076 bytes of memory as listed. About the only operating note regarding its use concerns the inputting of the wind direction. The wind direction must be inputted as one of eight major compass points: N., NE, E., SE, S., SW, W., NW. Note that the abbreviation of the four major points (North, East, South and West) must be followed by a period. Also, make note of the fact that the wind direction you must input refers to the direction the wind is blowing from, not towards.

We have noted one anomoly in the HP-75's operation. If you try to terminate a displayed line by pressing the RTN (return) key in order to defeat a set DELAY time, the computer apparently also accepts that input as an entry to the next INPUT statement it encounters! One solution to the problem seems to be to insert a dummy statement, such as W$=KEY$ just before the next INPUT statement that will be encountered following such an operation. This will "intercept" the key used to terminate the DELAY operation.

AVOID FROSTBITE!

January and February are predicted to be colder than average in much of the northern part of the U.S. this year. However, you can avoid frostbite by using this program to obtain the wind chill equivalent temperature. This program should run on just about any Sharp/Radio Shack PC, including the new 1250/1251 models! It was submitted by *Emerich Auersbacher* who included these comments and information:

The wind chill equivalent temperature is a useful indicator of how cold a person actually feels when exposed to various combinations of temperature and wind velocity. The accompanying program is especially useful to skiers or people who need to work or otherwise be outside during cold weather.

The program is based upon heat gain/loss equations originally developed by Siple and Passel from wind chill experiments performed at the Antarctic in 1941. The equation takes into account heat loss from radiation, conduction and convection, and is based upon an average skin temperature of 33C (91.4F).

Inputs required to run the program are the temperature (in degrees Fahrenheit) and the wind velocity in miles-per-hour. If you do not have a mechanical indicator of wind velocity, you may use the accompanying table to obtain an approximation of the wind velocity in miles-per-hour.

The program includes a frostbite alarm/alert feature. The message:
DANGER: FROSTBITE ALERT
is displayed when weather conditions combine to give a wind chill of minus 20 degrees Fahrenheit or less. Under those conditions, exposed flesh is subject to frostbite at a rapid rate. The message:
FROSTBITE WARNING
is flashed on the display when the wind chill drops below minus 10 degrees Fahrenheit. Frostbite is possible at this temperature if one is not careful.

*** THE BEAUFORT SCALE OF WIND FORCE ***

WIND	VELOCITY (mph)	DESCRIPTION
Calm	< 1	Smoke rises straight up.
Light	1 – 3	Smoke drifts, wind vanes motionless.
Slight	4 – 7	Felt on face, leaves rustle.
Gentle	8 – 12	Constant motion of leaves and twigs.
Moderate	13 – 18	Dust raised, small branches sway.
Fresh	19 – 24	Small trees sway, wavelets form.
Strong	25 – 31	Large branches sway, wires whistle.
High	32 – 38	Large trees sway, walking difficult.
Gale	39 – 46	Twigs break off trees.

Program *Wind Chill Factor*

```
 5:BEEP 1:PAUSE "
   WIND CHILL FAC
   TOR"
10:INPUT "WIND SP
   EED (MPH): ";V
   :V=.44704*V
15:IF V<1.78816
   LET V=1.78816
20:INPUT "TEMPERA
   TURE (F): ";T:
   T=5/9*(T-32)
30:A=10.45:B=10:C
   =-1
40:H=(A+B*√V+C*V)
   *(33-T)
50:T=33-(H/22.034
   ):T=9/5*T+32
60:U=5/9*(T-32):U
   =INT (10*U+.5)
   /10:T=INT (10*
   T+.5)/10
70:IF T<-19BEEP 5
   :FOR Z=1TO 4:
   PAUSE "DANGER:
    FROSTBITE ALE
   RT";PAUSE " ":
   NEXT Z:GOTO 90
80:IF T<-10BEEP 3
   :FOR Z=1TO 4:
   PAUSE "  FROST
   BITE WARNING":
   PAUSE " ":NEXT
   Z
90:PRINT "WIND CF
   = ";T;"F (";U;
   "C)"
100:GOTO 10
STATUS 1          424
```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FROM THE WATCH POCKET

A warm welcome to all of our new and renewing 1983 subscribers. We are now in our third year of publication. It looks as though there will be a lot of new PC entries this year....

On the top of the rumor mill is the buzzing over several initial entries about to be released by Texas Instruments. Could be as many as three models. It appears they are waiting for the CES exposition in Las Vegas to unveil?

Sharp appears to be aiming for the educational market with their PC-1250 in the U.S. They have opted to keep the cost low and will apparently not make the PC-1251 available in the United States. The PC-1251 is identical to the PC-1250 except that it has about twice as much user RAM. It has been available for several months in Japan, parts of Europe and Canada. The retail price is about $50.00 higher than that of the 1250. I think Sharp is making a mistake in not making the unit available to the U.S. market. Many customers who cut their teeth on the PC-1211 would love to upgrade to a wallet-size PC that had twice as much memory and six times the speed. They will think twice about buying a unit with all those nice enhanced BASIC instructions and yet not enough memory to really make good use of capabilities such as 2-dimensional arrays.

On the positive side, Sharp seems to be moving in the right direction with its 1250/1251 expansion equipment. I used to point out that it was inconvenient to have to carry a whole passel of equipment to have a practical system. That is, with the PC-1211 you had the printer/cassette interface, plus a tape recorder, plus connecting cables, plus regular-size cassette tapes, etc. The net result was that you had to carry essentially a whole briefcase full of gear in order to have a useful system.

Now, at least, the amount and size of the accessories have been cut substantially. The combination cassette/printer unit now includes the tape recorder (in microcassette form). When the PC-1250 is mounted on this unit, the entire system is about the size of a typical textbook. No more messy cables. You can stuff a handful of microcassettes in your pocket. Recording reliability should improve. It sure is a lot neater.

That the U.S. educational market is upper in Sharp's mind is apparent by the *Student Computer Handbook* they are providing with the PC-1250. It is the first PC book I have seen them deliver that has a chance of receiving some praise from users. I guess they finally figured out U.S. customers wanted to read English. This "self-teaching tutorial operator's manual" was developed for Sharp by the New York Institute of Technology. Compared to previous manuals, this one exhibits a little bit of class. You can actually understand what they are talking about! Bravo, Sharp, please keep commissioning those type of supportive publications.

If you have been sitting around waiting for all those nice software modules for the PC-1500 that have been promised for some time, just keep waiting. The latest story I have heard is that the developers were told they had to use a different type of ROM than originally planned on. Scratch three months of the delivery schedule. Current promises are for modules being available, perhaps, in February. I have seen some of the outputs (they make extensive use of the optional printer/plotter) from these modules. They look good. If they can ever get around to delivering them (before the PC-1500 is obsolete), they will probably move pretty well. The anticipated pricing is about $69.95 per 16K (ROM) module.

Speaking of software, Radio Shack will soon be releasing its first cassettes containing programs for the PC-2. Four have been announced so far: Personal Finance ($19.95), Business Finance ($19.95), Games Pak [sic] ($14.95) and Invasion Force ($9.95). The latter requires the addition of a 4K RAM module to the PC. It appears to be similar in some respects to the old classic Startrek game. Keep an eye out at your local Radio Shack Computer Center for the arrival of these packages.

If you have been getting some strange weather forecasts from the Weather program in Issue 20 of *PCN*, try correcting line 500 to read:

```
500 Z=1:IF X=3 LET Z=8
```

A number of people sent in samples of Christmas and Holiday cards they they generated on their PCs. It was quite enjoyable seeing the talent exhibited by so many PC users.

Thank You!

— *Nat Wadsworth, Editor*